WATER QUALITY EDUCATION

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The purpose of this session is to examine and discuss some ideas regarding the content of, delivery options for, and public policy education on water quality issues. Emphasis is on the contributions of agriculture to the water quality problem, primarily through nonpoint pollution. The session is less concerned with other forms of agricultural pollution and the point source pollution problems associated with urban concentrations. Although policy educators are involved in training in these other areas, this workshop has a more limited purpose.

The policy setting for water quality education in nonpoint pollution draws on two major pieces of national legislation: the 1972 admendments to the Federal Water Pollution Control Act, in which EPA has major responsibility for reducing water pollution including that from agriculture; and the Soil and Water Resources Conservation Act (RCA) of 1977, which emphasizes the on-site impacts of soil erosion. In the initial implementation stages of these two laws there was virtually no interagency coordination. That situation has been improved in recent years, to the point that the Environmental Protection Agency (EPA) and the United States Department of Agriculture (USDA) are coordinating their efforts in dealing with on-site and off-site impacts of erosion. It is misleading to suggest that there is full coordination between these agencies, but at least there is structured interaction. Because actions by farmers on the land create *both* the on- and off-site results of erosion, behavioral changes by farmers are essential to success in both categories. Implementation priorities aimed at the water quality problems, however, might be quite different from those concerned specifically with farm productivity. "Targeting" would not produce the same policy mix for both objectives.

It is likely that in coming months EPA and USDA will find it to their mutual advantage to cooperate much more closely in policy implementation. Each has significant strengths that are complemented by the role of the other.

A key issue in nonpoint pollution abatement is the matter of who should pay for improved water quality. The received wisdom in nonpoint abatement is that action by the farmer must be voluntary, with cost sharing provided. Federal and state agencies have been reluctant

to tamper with the presumably untouchable notion of private property rights. There is much emphasis on education and technical assistance through soil conservation districts to try to convince farmers that they should act in ways sensitive to the general public interest. In fact, education that concentrates on nonpoint pollution may be counter productive. It could demonstrate to the farmer very clearly that any sacrifice he makes by installing soil conservation practices that have little effect on his farm income will generate benefits only for parties somewhere downstream. That is a tough case to make.

WATER QUALITY MANAGEMENT AND POLICY: AN INSTITUTIONAL FRAMEWORK FOR EXTENSION EDUCATION

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In 1972 the concern for the degradation of the waters of the United States from nonpoint source pollutants was codified in amendents to the Federal Water Pollution Control Act (FWPCA). Section 208 comprises the pivotal statutory provision for controlling nonpoint pollutants. Following the courts 1975 decision requiring areawide planning for all rural areas, states were compelled to identify problems and devise control strategies for the 95 percent of the country not included in then existing management plans. The resulting state management plans depend heavily upon traditional soil conservation programs and practices to control agricultural nonpoint sources of pollution. Most state programs involve voluntary participation and compliance using educational strategies and informational activities rather than mandatory regulations [1].

The broadening of goals of conservation agencies to include water quality in the 1970s stemmed in a large part from the external pressures from the United States Environmental Protection Agency (EPA) and the environmental movement. The expansion of the interests of local conservation agencies into water quality, for example, was encouraged in 1975 by EPA. Grants were made to agencies in Montana to demonstrate the use of local conservation districts to control sediment, the major source of agricultural nonpoint pollutants [2].

The 208 process set in motion a complex set of institutional arrangements and interdependencies to implement water quality policy within each state. The two United States Department of Agriculture (USDA) agencies primarily concerned with soil conservation, the Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS), were in competition for major roles in the water quality programs for agricultural areas. The heavy reliance on voluntarism to control agricultural nonpoint sources of pollution through

landowners installing and maintaining best management practices (BMP's) has challenged extension economists, natural resource specialists, and policy educators.

The role of extension professionals in the 208 process is quite varied across states. The reasons for the variation stem, in part, from 1) historic institutional relationships between extension and SCS, ASCS, and the designated state management agency, 2) the structure of the 208 program in the state and 3) the pre-208 commitment of extension resources to conservation education. This latter variation impacted the perception held by federal and state agencies on the ability of extension to contribute to the task of reducing agricultural nonpoint pollution and improving water quality. In some cases the program development philosophy of extension, relying on decentralized program planning mechanisms, caused internal difficulties for extension and exacerbated any interagency uncertainties.

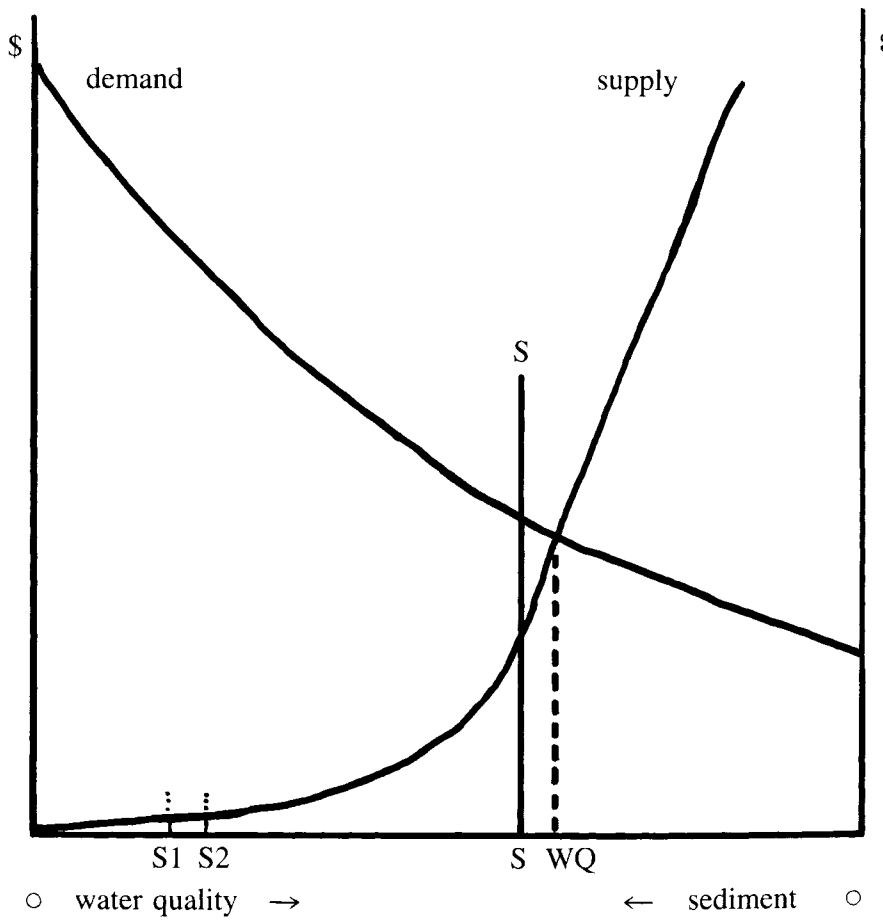
The objective of this paper is to overview the water quality extension programming efforts in one state as an example of one approach. However, to put the program in context, a general conceptual framework for water quality policy is presented first. This framework provides a perspective on voluntarism and education as mechanisms to achieve water quality through reduced sediment. This perspective is important in identifying opportunities for success and constraints to be overcome with water quality education programs. Next, the institutional setting involving federal, state, and local agencies is overviewed. The decision making arrangements in place provide the parameters and differentiate clientele for extension programs. The intention is not to exhaustively detail the structure within each state, but to overview the general character of the responses in the individual states to 208 mandates.

A Conceptual Framework

A market equilibrium diagram can be adapted for use in analyzing water quality. Water quality can be characterized as possessing most qualities of a public good. For our purposes we will measure water quality from left to right along the horizontal axis in Figure 1. From right to left, then, is the measure of the "bad". In this case, sediment, which is assumed to lower water quality, increases from right to left. The vertical line on the right represents the point of complete abatement and no sedimentation or soil erosion. The left extreme on the horizontal axis is zero abatement, a high level of soil erosion and "poor" water quality because of nonpoint pollutants. The diagram assumes that controlling soil movement is tantamount to controlling agricultural nonpoint source pollutants[4].

The marginal benefit curve reflects the money value of an incremental reduction in sediment or symmetrically the money value of an incremental increase in water quality. The supply curve for water quality reflects the incremental costs necessary to provide increasing

FIGURE 1
MARKETING DIAGRAM FOR WATER QUALITY



levels of sediment abatement (soil erosion control) and, thus, water quality. The textbook optimal level of water quality and soil erosion is WQ where marginal benefits equal marginal costs (assuming no income effects and no transactions costs).

The value of the analysis for looking at extension programs is in the insight gained on the likelihood of success and the challenges that need to be understood. Of course, the exact specification of benefit and cost functions has prohibitively high information costs. The benefit

curve shifts with income, population growth, and changes in tastes and preferences. Public finance literature about whose preferences count in the collective determination of the demand for government goods and services suggests that preferences of bureaucrats bias the outcome of the policy process. The result is the provision of too many goods such as water quality relative to the preference of the voter/citizen[3].

The supply curve is a function of production technology and the opportunity costs of producers. Strong commodity markets increase the opportunity costs of producers and shift the supply curve of abatement up.

In most states the 208 programs, through the planning process and in some instances companion changes in state laws, have established standards for soil loss. These policies are represented by the arbitrary line SS. It is arbitrary in respect to WQ. As illustrated, the standard results in too little abatement and not enough water quality relative to the social optimum since marginal benefits exceed marginal costs at S. Our concern is mainly with the supply function and the effectiveness of education in altering producer behavior and increasing the production of sediment abatement. We are not concerned with educational programs aimed at the policy process which determines the benefit function and initially establishes the standard. A simplistic conclusion is that if costs are low, social pressure and education may succeed in increasing abatement and water quality and achieving the standard. However, when costs become high, voluntary compliance induced by educational programs may not work well.

Of course, technological innovation that shifts the supply curve down will increase the success of water quality education programs. Also, programs that encourage adoption of existing technologies and cultural practices that lower the cost of abatement will enjoy some success. These decisions by producers are impacted by the turnover of nonland capital in the farm business, the tenure pattern, and other factors[2].

The diagram demonstrates the situation in which initial success may be experienced with educational programs to achieve interim standards. In this case the cost of increasing abatement from S1 to S2 is such that educational efforts may induce changes in producer behavior. However, the likelihood of education encouraging voluntary compliance to reduce sediment from S2 to SS is less because of the significant increase in the cost of sediment reduction. Initial successes may result in an over reliance on education and less serious consideration of other approaches.

This oversimplification certainly does not reveal all the complexities of the real world and the issues surrounding the achievement of water quality goals through reduced soil erosion. It does, however, provide a mechanism to view the role of educational programs in encouraging voluntary compliance with sediment abatement standards. The wid-

ening of the interests of traditional conservation agencies to include nonpoint pollution abatement established a more complex setting in which water quality educational efforts occur. These institutional evolutions are discussed next.

Institutional Setting

A Conservation Legacy. The water quality issues of today, as they relate to agricultural nonpoint sources of pollutants and sediment control, are imposed on a 50-year history of conservation concerns. The initial focus of soil conservation, to maintain farm productivity, is codified as a national policy in the Soil Erosion Act of 1935. The SCS was established to implement the 1935 act through the provision of technical assistance to landowners. The USDA took the initiative in 1936 to establish local agencies to guide conservation efforts and released the Model Standard Soil Conservation Districts Law. The districts were envisioned as special units of local government designed to oversee SCS assistance to landowners. By 1947 all states had authorized soil conservation districts. In general, district boundaries conform to county lines and their funds are generated through local and state appropriations and fees. The governing boards usually consist of five elected or appointed residents from the district. Some states require members to be landowners. Most districts do not have general taxing and bonding authority [1; 2].

District board members typically have close ties to agriculture. To receive technical assistance from SCS, a conservation district must enter into a memorandum of understanding with USDA. A conservation agency at the state level was also established. This unit is generally found in state departments of agriculture. The policy focus of the districts and the SCS has historically been on soil productivity with strong clientele support from agriculture.

A New Angle. The soil erosion problem was approached from a new angle with the 1972 enactment of FWPCA. Water quality concerns required that each state develop a water quality management plan to study all sources of pollution. Section 208 of FWPCA contained the statutory authorization for actions to reduce sediment to achieve water quality improvements. The 208 planning process put a focus, for the first time, on agricultural nonpoint sources of pollution such as sediment. In 1975 the courts construed that 208 required planning for all rural areas. By early 1982, 209 of 222 possible areawide management plans had gained conditional or final approval [1].

To be fully approved, a plan must contain adequate authority to control activities and pollutants and to require the application of best management practices. A designated state management agency must be identified and shown to have the necessary staff, funds, and authority to achieve water quality goals. EPA guidelines state that a mandatory program will be required if and when it is the only practical

method of securing nonpoint pollution control. However, nonregulatory programs must show promise of being effective to gain approval. In general, EPA's initial approach was to allow states to use existing laws and programs. Current state plans for controlling nonpoint source pollution expire between 1984 and 1986 at which time the EPA will evaluate each state's strategy and progress.

The federal strategy in carrying out 208 was to coordinate the activities of the traditional conservation agencies and their expanded water quality objectives as much as possible in planning and implementing programs. This resulted in some competition between SCS with its technical assistance mission and ASCS with its cost-sharing responsibilities. In 1977 SCS established an Office of Water Quality and was to give leadership to USDA working groups involved in the state 208 planning efforts. The interagency confrontations were not insignificant as each sought to establish its legitimacy and value in achieving the legislated nonpoint pollutant water quality policies[2].

State Implementation. In most states the state agency assigned the responsibility for agricultural nonpoint pollution control was the agriculture or conservation/natural resources department. A 1980 survey identified 34 states in which the state soil conservation agency was the designated management agency. All states with approved agricultural pollution control programs depend on local soil conservation districts for local leadership, SCS for technical assistance, and ASCS for financial help[1].

A major concern early in the 208 planning process was the lack of preparedness of conservation districts to fulfill their role in implementing section 208 management programs. In 1976 the EPA and the National Association of Conservation Districts launched a major education effort to attempt to remedy this problem. Efforts were also undertaken to increase the professional staff of districts and their funding. Direct state and local appropriations for districts in all states increased from $24.4 million in 1976 to $51.2 million in 1981. Adjusted for inflation, this represents a 39 percent increase. While districts' professional staffs increased, a 1980 survey of 17 states revealed needs for 506 additional technical employees to implement nonpoint pollution programs effectively[1].

State Strategies. State management plans generally rely on voluntary measures to implement agricultural nonpoint pollution controls. Twenty-seven states rely exclusively on education, technical assistance, and information measures. Sixteen states (including Idaho, Illinois, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Ohio, and Wisconsin) provide financial assistance through state cost-sharing for implementing control measures. The other states depend exclusively on the federal government for conservation cost-sharing funds[1].

Approximately 12 states (e.g. Iowa) provide for some form of regulation as part of their control programs. However, voluntary compli-

ance is also emphasized in these states with required conformance often obligating state cost-sharing financing at 75 percent or a similarly specified level. Without the state cost-sharing funds, compliance cannot be mandated. The reluctance of states to regulate agricultural pollutants stems from the paucity of data sufficient to establish the culpability of particular landowner-polluters as well as the general unpopularity of enforcement actions[2].

Illinois Response

The Illinois sediment control water quality policy concerning agricultural nonpoint source pollutants is fairly representative of state management programs in that it combines voluntary and mandatory measures with the emphasis clearly on voluntary compliance. Illinois' State Water Quality Management Plan was adopted in 1979. Working through Illinois' 98 conservation districts (Soil and Water Conservation Districts, SWCDs), the Illinois Department of Agriculture (IDOA) is to bring erosion levels on all privately held agricultural land to "T" by the year 2000[5].

The Illinois Soil and Water Conservation District Act was amended in 1977 to require district erosion and sediment control programs. This legislative action put the state's statutory policy in line with the administratively adopted 208 plan. The state's step-by-step plan required the IDOA to issue guidelines for use by the local districts in developing local soil loss tolerance values. During 1981 and 1982, the 98 districts set local erosion-control standards and 16 of them opted for more stringent standards than the state's guidelines. These standards went into effect on January 1, 1983.

The goal of "T by 2000" is to be achieved in steps. Essentially, the goal means that by the year 2000, all farmland in Illinois should meet what is known as the soil-loss tolerance level, or the T value. When erosion exceeds the T value, soil is being lost so fast that its natural productive capacity is being diminished. The goal to achieve water quality is stated and measured in terms of traditional standards designed to evaluate the impact of soil loss on agricultural productivity. Implicit is the assumption that achieving productivity goals will meet the requirements of the water quality policy.

The step-by-step plan consists of a series of interim goals that will gradually bring lands into compliance.

1) January 1, 1983—4T
2) January 1, 1988—2T
3) January 1, 1994—1.5T
4) January 1, 2000—T

The implementation and enforcement of the local ordinances is being undertaken by increased district professional staff and a voluntary compliance focus. The objective is to have a professional employee for

each district. In 1984 about 75 of Illinois' 98 SWCD districts had a professional Resource Conservationist. All districts have a full-time secretary who often performs the duties of an administrator for the five member part-time district board.

There is also a complaint process by which citizens can file a complaint alleging a landowner is in violation of the local erosion ordinance. SWCDs are also authorized to file complaints. It is the district's responsibility to determine the validity of complaints and to work with violators to try and obtain voluntary compliance. If cooperation is not obtained, a public hearing is held to bring public pressure and community sentiment to bear. If corrective actions are still not agreed upon, the IDOA holds a formal hearing and conducts an official inquiry. Again, the emphasis is on obtaining the adoption of best management practices voluntarily. Beyond this step, the only possible measure is to refer the case to the Illinois Pollution Control Board. The Board may be able to enforce the standards if it can prove that water quality is being threatened.

Water Quality Extension Program. The involvement of extension in the 208 program in Illinois began in the early planning stages. A major reason for this development was the long-standing working relationship the natural resource specialist had with SCS, IDOA and the Illinois Soil and Water Conservation Districts. Beyond direct leadership in the planning process and the continuation of long-standing soil erosion programs, a new initiative was taken to develop publications and support materials that would contribute to the educational focus of the state water quality plan. The program was not an advocacy program but an effort to present information in an objective manner that explained the 208 plan, the local implementation ordinances, and the function of the districts[5].

The audience for the program is landowners. Rather than focusing on a centrally delivered program, the materials were designed for use by the county staff of extension and SCS. In general the program consists of a series of pamphlets each accompanied with a 20 minute slide set with a script and professionally taped narrative. To date six pamphlets and slide sets have been developed. This approach was taken with the realization that traditional delivery methods through county meetings would not reach all the potential audience. The logic of the pamphlet series is organized to begin with a description of the issues and the problem, the "T by 2000" 208 program and amendment to the state's soil and water conservation district law, and then move through solutions available to landowners. The latter pamphlets become more technical and describe, for example, the establishment and management of grasses on critical areas.

In addition to a program for landowners, efforts are underway, with support from IDOA, to increase the capacity of SWCD board members. Designed around four modules, a series of workshops are to be taught

by teams of field staff from extension, SCS, ASCS, and district professional employees. The modules include participant workbooks, teacher guides and slide sets. The 500 district board members are to receive initial training in 1984-1985. The workshops will be repeated as necessary to provide new board members an opportunity to participate in training sessions. More then 20 hours of planned lectures and exercises are included. The ten regional teaching teams underwent extensive train-the-trainer seminars to prepare them to teach the workshops. The major topics taught are 1) roles and responsibilities of district board members, 2) team building in SWCDs, 3) community analysis for community action and 4) conflict management in SWCDs.

Concluding Comments

The policy directions evident from recent changes at the national level suggest some reemergence of traditional agricultural productivity soil erosion control objectives. However, the institutional forces set in motion to address water quality issues related to sedimentation and soil erosion will continue to warrant attention. The review of state nonpoint pollution control and management plans in the near future will likely provide a renewed focus on water quality objectives. At the same time the decentralized structure responsible for achieving water quality goals codified in the FWPCA will move forward relying, at least for now, on education, technical assistance, and limited cost-sharing funds to achieve voluntary compliance and the implementation of BMPs.

The challenge for extension is to realize the opportunities and limitations of educational activities in contributing to the realization of water quality goals. A good place to look for opportunities for increased educational programming is with the elected and appointed officials responsible for operating the programs of the conservation districts.

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